NETTS PROJECT/DEMONSTRATION SUMMARY

NCBC-02-94

Title: Site Characterization and Analysis Penetrometer System, Laser Induced Fluorescence (LIF)

Lead PI/Affiliation: NRaD
Co-PI's/Affiliations: NRaD

Date/Duration:
Initiated - 09/94
Completed - 04/96

Abstract:

The site characterization and analysis penetrometer system (SCAPS) with laser induced fluorescence (LIF) sensors was demonstrated as a quick field screening technique to determine the physical and chemical characteristics of subsurface soil and water contaminants at petroleum, oil, and lubricant hydrocarbons contaminated sites. SCAPS is a collaborative development effort of the Navy, Army, and Air Force under the Tri-Service SCAPS Program.

SCAPS is a suite of equipment mounted on a specially engineered 6 by 6 truck (60,000-pound weight class). The heart of SCAPS is the suite of sensors designed to detect petroleum products and to determine soil characteristics. One of two configurations demonstrated was a monochromatic (single light wavelength) LIF sensor and support system that is currently used in the Army and Navy SCAPS units. The other configuration, which is Air Force developed, uses a tunable (selective light wavelength) dye laser-equipped induced fluorescence system called the rapid optical screening tool (ROST). The laser energy excites the contaminant molecules, thus generating light (fluoresce) at different wavelengths. The fluorescent response measurement is directly related to concentration of the petroleum contaminant in the soil. ROST uses a photo multiplier tube approach in which a selected light wavelength can be used to cause contaminants to fluoresce. Thus identification of specific petroleum compounds is possible.

The demonstration was designed to highlight the LIF SCAPS and ROST technology as a field screening method by comparing real-time in-place data to data produced by conventional sampling and analytical methods. For the purposes of the demonstration, conventional sampling and analysis will consist of taking soil samples from along the edge of SCAPS's push holes. Sample portions will be submitted to an analytical laboratory to support verification of the LIF SCAPS and ROST capability to characterize subsurface geology and soil parameters.

Results/Conclusions:

This demonstration led to certification under the State of California, Department of Toxic Substances Control, Certification No. 96-01-021, dated: August 5, 1996.

Publications:

1) Stang, P., "LIF/CPT Technology Predemonstration and Demonstration Summary Report NCBC Port Hueneme Fuel Farm", PRC Environmental Management, July 1995.
2) USEPA, "The Site Characterization and Analysis Penetrometer System (SCAPS) Laser-Induced Fluorescence (LIF) Sensor and Support System Innovative Technology Verification Report", EPA/600/R-97/019, February 1997.
3) USEPA, "The Rapid Optical Screening Tool (ROST) Laser-Induced Fluorescence (LIF) System for Screening of Petroleum Hydrocarbons in Subsurface Soils, Innovative Technology Verification Report", EPA/600/R-97/020, February 1997.